
Broadband Wireless Standards

Outputs

- Preparation of technical standards and documents for the ITU-R that support the U.S. interest in broadband wireless systems.
- Development of new radio propagation algorithms or methods that improve spectrum usage of wireless systems.

The wireless industry made projections on how they expected the rollout of technology to progress, as shown in Tables 1 and 2. Both the number of users and the types of services (beyond just voice communications) are increasing, with more emphasis on Internet-type uses. These new services require greater bandwidths (and more radio spectrum).

In order to predict wireless signal coverage more accurately, ITS and other research organizations are developing and evaluating propagation models that are more responsive to the needs of cellular and private land mobile radio service providers. A common model used by system planners is the ITS Irregular Terrain Model (ITM), also known as the Longley-Rice model. While a good predictor in irregular terrain, it does not have the capability to utilize land-use, land-cover databases to predict losses due to man-made objects. Another common model is the Okumura-Hata model. It is a good predictor in urban and suburban environments, but it does not handle irregular terrain nor does it handle changing environments, e.g., from urban to suburban to rural.

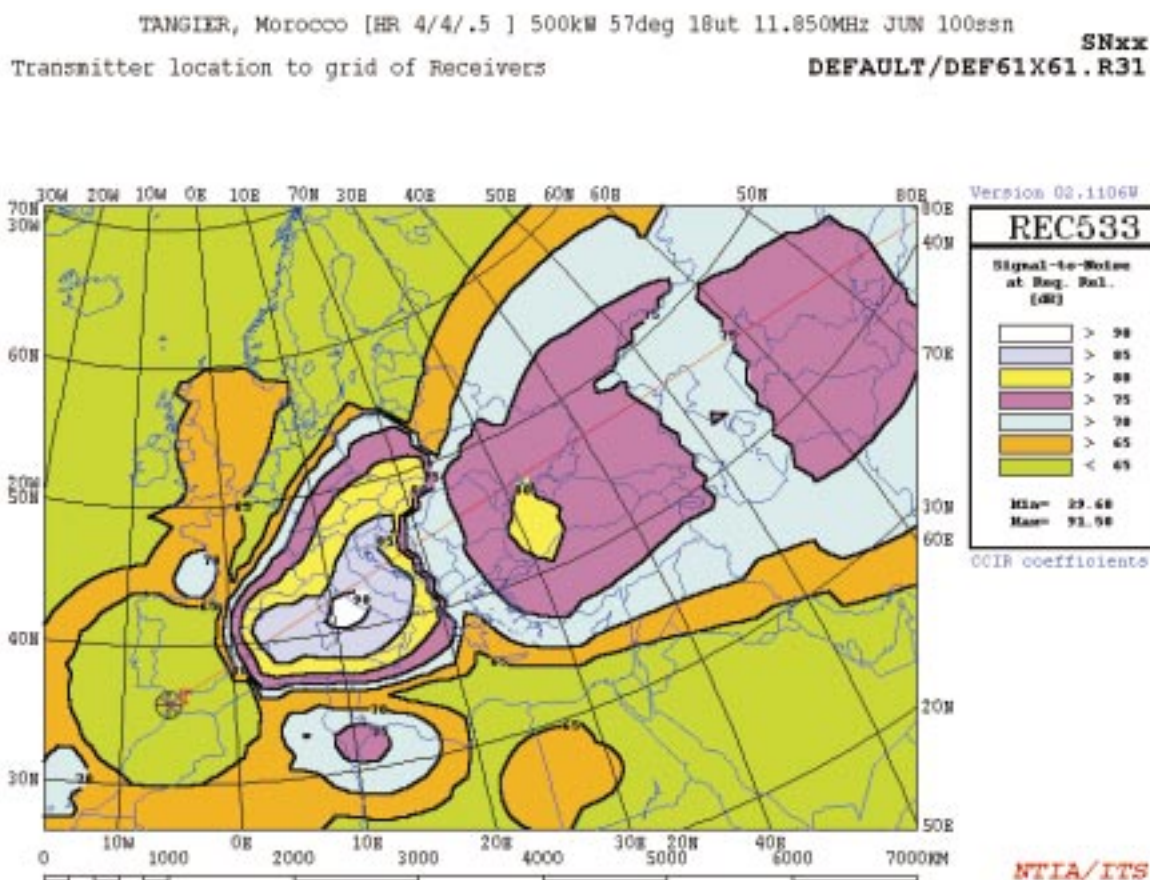
Table 1. Growth in Subscriber Penetration for Wireless Services

	1998	2000	2002
Wireless service subscriber penetration in the U.S.	24%	35%	42%

Table 2. Growth in Subscribers (North America) by Wireless Service Technology

Technology	1998	2000	2002
Advanced mobile phone service (AMPS), analog	53 million	42 million	24 million
Time Division Multiple Access (TDMA), digital	10 million	27 million	44 million
Code Division Multiple Access (CDMA), digital	8 million	27 million	52 million
GSM, a TDMA standard developed in Europe with worldwide use	4 million	10 million	20 million

Radio propagation predictions made using land-use, land-cover databases should estimate signal losses due to objects on a propagation path more accurately than predictions calculated without knowledge of the obstacles. The improved predictions allow service providers to better evaluate locations for base stations and to predict where additional base stations might be needed to fill in areas of inadequate signal coverage. ITS is evaluating the incorporation of land-use, land-cover databases into the ITM propagation prediction model to provide better estimations of signal loss. Although better databases are now available for land-use, land-cover descriptions, the signal loss associated with the various land-use, land-cover categories is not well known, nor is the loss versus frequency well known. ITS is also evaluating the means of incorporating terrain obstacle information into the Okumura-Hata model, to make it more responsive to the changing environment.



Example output from the High Frequency propagation software developed by the ITU for international frequency coordination and maintained by ITS.

Another effort supported by ITS is the international development of propagation prediction models that can be used by spectrum managers and system planners of both land mobile, terrestrial broadcast, maritime mobile and certain applicable fixed (e.g., point-to-multipoint) services. As these services are becoming more similar in terms of RF equipment characteristics, it is appropriate to use the same propagation model for planning and coordination of these services.

The ITU-R Study Group 3 on Radio Propagation has recently developed and adopted such a model, ITU-R Recommendation P.1546, which blends features that the services had previously used independently of one another, thereby clarifying and unifying planning and coordination activities across the services.

ITS is a member of the ITU Study Group 3 Working Party 3L. This study group deals with Ionospheric Propagation. ITS is responsible for maintaining the

High Frequency (HF) (3-30 MHz) propagation software developed by the ITU for international frequency coordination. The ITU web site:

<http://www.itu.int/ITU-R/software/study-groups/rsg3/databanks/ionosph/index.html>

links to an ITS web site with the following reference: HF sky-wave propagation (Rec. P.533) (available from the website of the U.S. Department of Commerce NTIA/ITS)

<http://elbert.its.bldrdoc.gov/hf.html>

An example of the type of output the software can produce is shown in the above figure.

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